

CLAIMS

1. A flexible circuit board, comprising:

a plurality of bumps which are directly formed on a surface portion of one of a wiring layer and a metal layer for wiring layer formation or formed thereon through an etching barrier layer, each of the bumps having an upper surface connected to a wiring film of another flexible circuit board; and

an interlayer insulating film including a non-thermoplastic polyimide layer and thermoplastic polyimide layers as bonding agents which are formed on both surface thereof, the interlayer insulating film being provided in a portion in which the bumps are not formed on a bump formation surface of the one of the wiring layer and the metal layer for wiring layer formation,

wherein one of the thermoplastic polyimide layers of the interlayer insulating film which is located on an opposed side of the one of the wiring layer and the metal layer for wiring layer formation is thicker than the other of the thermoplastic polyimide layers.

2. A method of manufacturing a flexible circuit board, comprising:

preparing one of a wiring layer and a metal layer for wiring layer formation in which a plurality of bumps are directly formed on a surface portion thereof or formed thereon through an etching barrier layer; and

pressurization-bonding an interlayer insulating film in which thermoplastic polyimide layers as bonding agents which have

thicknesses different from each other and are formed on both surface of a non-thermoplastic polyimide layer to a bump formation surface of the one of the wiring layer and the metal layer for wiring layer formation such that each of the bumps passes through the interlayer insulating film in a direction in which a thinner thermoplastic polyimide layer faces the bump formation surface.

3. A flexible multi-layer wiring circuit board comprising: a flexible circuit board in which a plurality of bumps are directly formed on a surface portion of one of a wiring layer and a metal layer for wiring layer formation or formed thereon through an etching barrier layer, an interlayer insulating film in which thermoplastic polyimide layers as bonding agents are formed on both surface of a non-thermoplastic polyimide layer is provided in a portion in which the bumps are not formed on a bump formation surface of the one of the wiring layer and the metal layer for wiring layer formation, and one of the thermoplastic polyimide layers of the interlayer insulating film which is located on an opposed side of the one of the wiring layer and the metal layer for wiring layer formation is thicker than the other of the thermoplastic polyimide layers; and an another flexible circuit board different from the flexible circuit board, in which wiring layers are formed on at least one main surface, at least a part of each of the wiring layers is connected to an upper surface of each of the bumps, and a space between the wiring layers on the one main surface is filled with a thicker thermoplastic polyimide layer molten.

4. A method of manufacturing a flexible multi-layer wiring circuit board, comprising:

preparing:

a first flexible circuit board in which a plurality of bumps are directly formed on a surface portion of one of a wiring layer and a metal layer for wiring layer formation or formed thereon through an etching barrier layer, an interlayer insulating film in which thermoplastic polyimide layers as bonding agents are formed on both surface of a non-thermoplastic polyimide layer is provided in a portion in which the bumps are not formed on a bump formation surface of the one of the wiring layer and the metal layer for wiring layer formation, and one of the thermoplastic polyimide layers of the interlayer insulating film which is located on an opposed side of the one of the wiring layer and the metal layer for wiring layer formation is thicker than the other of the thermoplastic polyimide layers; and

a second flexible circuit board in which wiring layers are formed on at least one main surface thereof; and

performing heating-pressurization processing for connecting at least a part of each of the wiring layers formed on the one main surface of the second flexible circuit board to an upper surface of each of the bumps and filling a space between the wiring layers on the one main surface with a thicker thermoplastic polyimide layer molten.

5. A method of manufacturing a flexible multi-layer wiring circuit board, comprising:

preparing:

two first flexible circuit boards, in each of which a plurality of bumps are directly formed on a surface portion of one of a wiring layer and a metal layer for wiring layer formation or formed thereon through an etching barrier layer, an interlayer insulating film in which thermoplastic polyimide layers as bonding agents are formed on both surface of a non-thermoplastic polyimide layer is provided in a portion in which the bumps are not formed on a bump formation surface of the one of the wiring layer and the metal layer for wiring layer formation, and one of the thermoplastic polyimide layers of the interlayer insulating film which is located on an opposed side of the one of the wiring layer and the metal layer for wiring layer formation is thicker than the other of the thermoplastic polyimide layers and

a second flexible circuit board in which wiring layers are formed on both surfaces thereof; and

performing heating-pressurization processing for connecting the wiring layers formed on the both surfaces of the second flexible circuit board to upper surfaces of the bumps of the two first flexible circuit boards and filling a space between the wiring layers of the second flexible circuit board with a thicker thermoplastic polyimide layer of each of the first flexible circuit boards.